

Criticism of Falsifiability

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Criticism of Falsifiability

Thomas Kuhn criticized falsifiability because it characterized "the entire scientific enterprise in terms that apply only to its occasional revolutionary parts," (Kuhn 1970) and it cannot be generalized. In Kuhn's view, a delimitation criterion must refer to the functioning of normal science. (Kuhn 1970, 802) But Kuhn ignored Popper's sophisticated falsification and his extended theory.

Kuhn objects to Popper's entire theory and excludes any possibility of rational reconstruction of the development of science. In Kuhn's view, "there can be no logic, but only psychology of discovery". (Lakatos 1978, 90)

In a brief comparison of Hume, Carnap and Popper, Watkins points out that the development of science is inductive and irrational according to Hume, inductive and rational according to Carnap, non-inductive and rational according to Popper. (Watkins 1968) Extending this comparison, it can be added that the development of science is non-inductive and irrational, according to Kuhn. (Lakatos 1978, 90)

Popper criticized Kuhn's demarcation criterion, claiming that Kuhn's criterion leads to a "major disaster...[the] replacement of a rational criterion of science by a sociological one." (K. Popper 1974, 1146–1147)

Stephen Toulmin asserts that Kuhn has practically exposed three successive theories of scientific change, departing from the original theory of "scientific revolutions." Kuhn interprets the contrast between "normal" and "revolutionary" change in two alternative ways: sometimes as a philosophical analysis, sometimes as a sociological hypothesis, so that the "paradigm" is duly ambiguous. (Toulmin 1967)

Paul Feyerabend, argued that it is neither possible nor desirable to distinguish between science and non-science. (Feyerabend 2010) He also rejected Lakatos's argument for ad-hoc hypotheses, arguing that science would not have progressed without using all available methods to support new theories. For Feyerabend, a special status of science can derive only from the social and physical value of its results, and not from its method.

Imre Lakatos states that by falsifiability Popper has made a disconnect between science's play (falsifiability) and the purpose of science (the development of true theories). To restore the

link between the game and its goal, Lakatos states that Popper has introduced a "whiff of inductivism."¹ (Lakatos 1978, 160)

Note that Lakatos's criticism of Popper is equally valid against himself. (Musgrave and Pigden 2016)

Popper's falsification has been criticized for both the exclusion of legitimate science (Hansson 2006) as well as for granting of scientific status to several pseudo-sciences. (Agassi 1991) (Mahner 2007, 518–19) Larry Laudan states that it "has the untoward consequence of countenancing as 'scientific' every crank claim which makes ascertainably false assertions." (Laudan 1983, 121)

W. Bartley, in 1976, argued that Popper had destroyed the dialogue. "the gulfs between Popper's way of doing philosophy and that of the bulk of contemporary professional philosophers is as great as that between astronomy and astrology." (Bartley 1976) Rafe Champion states that "his theory of conjectural knowledge does not even pretend to provide positively justified foundations of belief." (Champion 1985)

Putnam argues that the initial acceptance of Newtonian mechanics had little or nothing to do with falsifiable predictions, because scientists have accepted the success of theory in explaining the previously established phenomena. (Putnam, Gasper, and Trout 1974)

Hacking states that many aspects of scientific practice, including experiments, cannot be interpreted as attempts to falsify or corroborate. (Hacking 1983)

¹ "An inductive principle that correlates realistic metaphysics with methodological appraisals, verisimilitude with corroboration, which reinterprets the rules of scientific play "as a conjectural theory of the signs of knowledge increase, that is, the signs of increasing verisimilitude of our scientific theories." (Champion 1985, 156)

Physicists Alan Sokal and Jean Bricmont have criticized the falsifiability of not accurately describing the way science works, and that falsifiability cannot distinguish between astrology and astronomy. (Sokal and Bricmont 1999)

Some economists, like those of the Austrian school, believe that macroeconomics is empirically unfalsifiable. (Heath 2015) (von Mises 2014)

Many philosophers also assert that mathematics is not experimentally falsifiable, and therefore is not a science in accordance with Karl Popper's definition. (Shasha and Lazere 1998)

Some criticize Popper that his theory does not offer a legitimate alternative to the inductivist proposals he criticizes. Jeffrey argues that Bayesianism, with the emphasis on the extent to which empirical evidence supports a hypothesis, is much closer to scientific practice than Popper's falsifiability. (Jeffrey 1975)

One of the great challenges of falsifiability is the Duhem-Quine thesis. (Quine 1953) With regard to Newton's first law of inertia, it is assumed that a body is neither at rest nor in a uniform motion in a straight line and apparently not driven by an external force. This observation seems to reject Newton's law, but it's not this way. The planet's orbits are driven by gravitational forces: "The physicist can never subject an isolated hypothesis to experimental test, but only a whole group of hypotheses; when the experiment is in disagreement with his predictions, what he learns is that at least one of the hypotheses constituting this group is unacceptable and ought to be modified; but the experiment does not designate which one should be changed." (Ariew 2014) Because the first law is used along with many assumptions, it is not possible to reject the law if what the law provides is not accomplished, for supposing assumptions or additional assumptions may be to blame. Therefore, Newton's first law is unfalsifiable. (Mitra 2016)

D.C. Stove considers Popper's theory of scientific (non-statistical) and non-scientific statements to be simple denials or simple claims of existence or local existence. (Stove 1978) What Stove regards as "mere assertions of local existence", Popper calls them mere assertions of existence." In fact, he says, Popper's falsifiability criterion requires that a statement, in order to be empirical, be inconsistent with a certain basic statement in the sense stated by Stove. And a "mere denial of local existence," Popper calls it a "singular non-existence statement," which, when empirical, is an "instantial statements." According to Stove, a non-statistical law or theory of science empirical may be inconsistent with another, but Popper's philosophy of scientific statements is incompatible with this obvious fact, because Popper identifies laws or theories with simple denials of existence, and mere denial of existence cannot be inconsistent with another. Stove asserts that Popper's falsifiability criterion excludes from empirical science all those statements that, according to Popper himself, constitute the basis for observing science.

O'Hear believes that Popper's epistemology leads to unacceptable skepticism and cannot avoid a commitment to inductive procedures. (O'Hear 1996) Similarly, W. Salmon argues that Popper's idea of corroborating theory involves referring to inductive procedures. (Salmon and Hitchcock 2017)

Many other researchers, such as Miller, Tichý and Grünbaum, have argued defects in the official definitions of Popper's theory. Thus, it is believed that verisimilitude is important in Popper's system because of its application to the theories that are known to be false. In this sense, Popper wrote:

"Ultimately, the idea of verisimilitude is most important in cases where we know that we have to work with theories which are at best approximations—that is to say, theories of which we know that they cannot be true. (This is often the case in the social sciences). In these cases, we can still speak of better or worse approximations to the truth (and we therefore do not need to interpret these cases in an instrumentalist sense)." (Karl Raimund Popper 2002, 235)

Thornton argues that the problems of Popper's formal definitions were considered important because they have been linked to the verisimilitude of false theories. Miller and Tichý demonstrated that Popper's verisimilitude conditions for comparing the truths and falsity of content can be met only when theories are true. In the case of false theories, Popper's definitions are wrong. (Thornton 2017) Therefore, Popper's conditions to compare levels of veracity can never be met.

Following the failure of Popper's definitions in 1974, some critics believed that the entire theory of falsifiability has been undermined. Popper acknowledged the deficiencies, (Karl R. Popper 1979, 371) but argued that "I do think that we should not conclude from the failure of my attempts to solve the problem [of defining verisimilitude] that the problem cannot be solved." (Karl R. Popper 1979, 372) He lowered the importance of the concept in his philosophy, stating that he never intended to point out that degrees of verisimilitude cannot be determined, excepting certain limited cases, and arguing instead that the main value of the concept is heuristic and intuitive, and the absence of a formal appropriate definition is not so important in the evaluation of theories relative to issues in which we have an interest. (Thornton 2017)

Extension of falsifiability

Popper's delimitation criterion refers to the logical structure of theories. Imre Lakatos said that if a theory is scientific or non-scientific, it can be determined independently of the facts. (Lakatos 1973, 117) He proposed a modification of Popper's criterion, which he called "sophisticated (methodological) falsification", where the delimitation criterion should not apply to a hypothesis or isolated theory but to a whole research program. At Lakatos there appears a "hard core" of central thesis, that is resilient, constituting a research program. Thus, a research program is progressive if new theories make surprising predictions that are confirmed. Progress in science is only possible if each new theory developed in the program has empirically greater content than

its predecessor. Otherwise, the program is pseudoscientific. Good science is progressive, bad science is degenerative, and if a research program does not predict anything new or involves new predictions that never happen, then such degeneration could have turned into a pseudoscience. (Hansson 2017)

Lakatos' methodology was an attempt to reconcile Popper's falsification with Thomas Kuhn's paradigms. Lakatos proposed a middle way in which Kuhn's socio-psychological approaches were replaced by logical-methodological ones.

Paul Thagard believes that a theory is pseudo-scientific if it fails to progress and "the community of practitioners makes little attempt to develop the theory towards solutions of the problems, shows no concern for attempts to evaluate the theory in relation to others, and is selective in considering confirmations and disconfirmations." (Thagard 1978, 228) He proposed another set of principles to try to overcome these difficulties and considers it important for society to find a way to do so². Thagard states that sometimes theories will spend some time only as "unpromising" before they really deserve the title of pseudoscience.

Daniel Rothbart sets eligibility criteria according to which the theory should include the rigor's explanatory success and gain testable implications that are incompatible with those of the rival. (Rothbart 1990)

George Reisch proposed that the demarcation be based on the integration of theory properly in other sciences. In general, according to Reisch, an epistemic domain is pseudo-scientific if it cannot be incorporated into the existing set of established sciences. (Reisch 1998)

² According to Thagard's method, (Thagard 1978) a theory is not scientific if it fulfills two conditions: 1) It is less progressive than alternative theories over a long period of time and faces many unresolved problems; and ... 2) The community of practitioners is making little attempts or none to develop to solve the problems, is not interested in the evaluation of the theory and is selective in terms of confirmations and disagreements.

Sociologist Robert K. Merton (Merton 1973) proposed demarcation criteria based on the value of science, characterized by a spirit that can be summed up as four sets of institutional imperatives: universalism (affirmations must be subject to predetermined impersonal criteria), communism (the findings are products of social collaboration), disinterestedness (institutional control to reduce the effects of personal or ideological motives), and organized skepticism (detached examination of beliefs). (Hansson 2017)

Many other authors have proposed demarcation criteria to identify pseudoscience science. These typically include faith in authority, unrepeatable experiments, selected examples, unwillingness to test, non-compliance with rejection information, embedded subterfuges, abandoned explanations without replacement. (Hansson 2017)

In a notorious passage, Popper suggested that "[although] the degree of corroboration of a theory cannot be interpreted simply as a measure of its verisimilitude, it can be taken as an indication of how its verisimilitude appears at the time." (Karl R. Popper 1979) After all, Miller states, (Miller 2009) the degree of corroboration of any falsified theory gives no indication, however small, either about the verisimilitude of the theory or how well the Truth is approximated. Popper thought that a hypothesis that failed in some tests, but did not fail very badly, will give rise to a hypothesis with some predictions tested with certainty beyond the limits of experimental errors, but not too wrong, will be closer to the truth than to a failed radical rival one, even if both are falsified. (Miller 2009) But the lack of a solution to this difficulty is not an excuse for a retreat into instrumentalism, inductivism or irrationality, and should not prevent us from seeking a more modest answer to the incontestable fact that "not all cases of falsification are the same." (Kvasz 2004, 263)

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